

WHAT WE CLAIM IS

1. A screwdriver, comprising:

5 a motor,

a first rotating member that receives rotating torque of the motor,

a second rotating member that is adapted to rotate by receiving the rotating torque of the first rotating member,

10 a tool that performs a screw tightening operation by receiving the rotating torque via the first rotating member and the second rotating member,

a torque transmission spring that is closely wound around the first rotating member and the second rotating member when the motor drivingly rotates the first rotating member in a predetermined rotating direction, so that the torque transmission spring transmits the rotating torque of the motor from the first rotating member to the second rotating member, and

15 a torque transmission releasing device that moves in the axial direction of the first rotating member or the second rotating member in response to the screw-tightening torque, so that the torque transmission releasing device releases the close winding of the torque transmission spring around at least one of the first rotating member and the second rotating member so as to release the transmission of the rotating torque of the motor from the first rotating member to the  
20 second rotating member.

2. The screwdriver as defined in claim 1, wherein the torque transmission releasing device engages the torque transmission spring so as to prevent the torque transmission spring from being closely wound in the rotational direction of the first rotating member, so that the torque  
25 transmission releasing device releases the close winding of the torque transmission spring around

the first rotating member.

3. The screwdriver as defined in claim 1, further comprising a third rotating member that is disposed adjacent to the second rotating member and in the vicinity of the tool, the second rotating member being connected to the third rotating member via a clutch member, the clutch member being adapted to move toward the first rotating member in the axial direction in response to the screw-tightening torque, wherein the close winding of the torque transmission spring around the first rotating member is performed or released in response to the axial movement of the clutch member.

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4. The screwdriver as defined in claim 3, wherein the clutch member includes an engagement member that extends toward the first rotating member, the clutch member being urged away from the first rotating member by a spring, the clutch member being adapted and arranged to move toward the first rotating member so as to oppose to the biasing force of the spring when the screw-tightening torque exceeds a predetermined torque, such that the engagement member engages the torque transmission spring so as to release the close winding of the torque transmission spring around the first rotating member.

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5. The screwdriver as defined in claim 1, further comprising a first torque transmission path and a second torque transmission path, wherein the rotating torque of the motor is transmitted from the first rotating member to the tool via the torque transmission spring and the second rotating member through the first torque transmission path, and when the motor is rotated in a reverse direction so that the torque transmission by the torque transmission spring is released, the torque of the motor rotating in the reverse direction is transmitted from the first rotating member to the tool via a one-way clutch through the second torque transmission path.

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6. The screwdriver as defined in claim 1, wherein the rotating members are defined by spindles that rotatably extends to the longitudinal axis thereof, respectively.

5 7. The screwdriver as defined in claim 6, wherein each spindle rotates around the same longitudinal axis.

8. A method of using a screwdriver, wherein the screwdriver includes a motor, a first rotating member that receives rotating torque of the motor, a second rotating member that is adapted to rotate by receiving the rotating torque of the first rotating member, a tool that performs a screw tightening operation by receiving the rotating torque via the first rotating member and the second rotating member, a torque transmission spring that is closely wound around the first rotating member and the second rotating member when the motor drivingly rotates the first rotating member in a predetermined rotating direction, so that the torque transmission spring transmits the rotating torque of the motor from the first rotating member to the second rotating member, and a torque transmission releasing device that moves in the axial direction of the first rotating member or the second rotating member, comprising:

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releasing the close winding of the torque transmission spring around at least one of the first rotating member and the second rotating member by means of the movement of the torque transmission releasing device in the axial direction so as to release the transmission of the rotating torque of the motor from the first rotating member to the second rotating member in response to the screw-tightening torque.

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9. A screwdriver, comprising:

25 a motor,

a first rotating member that receives rotating torque of the motor,

a second rotating member that is adapted to rotate by receiving the rotating torque of the first rotating member,

a tool that performs a screw tightening operation by receiving the rotating torque via the first rotating member and the second rotating member,

a torque transmission spring that is closely wound around the first rotating member and the second rotating member when the motor drivingly rotates the first rotating member in a predetermined rotating direction, so that the torque transmission spring transmits the rotating torque of the motor from the first rotating member to the second rotating member, and

means for releasing the torque transmission by releasing the close winding of the torque transmission spring around at least one of the first rotating member and the second rotating member by means of a movement in the axial direction of the first rotating member or the second rotating member in response to the screw-tightening torque, so as to release the transmission of the rotating torque of the motor from the first rotating member to the second rotating member.

10. The screwdriver as defined in claim 9, wherein the torque transmission releasing means engages the torque transmission spring so as to prevent the torque transmission spring from being closely wound in the rotational direction of the first rotating member, so that the torque transmission releasing means releases the close winding of the torque transmission spring around the first rotating member.

11. The screwdriver as defined in claim 9, further comprising a third rotating member that is disposed adjacent to the second rotating member and in the vicinity of the tool, the second rotating member being connected to the third rotating member via a clutch member, the clutch member being adapted to move toward the first rotating member in the axial direction in response to the

screw-tightening torque, wherein the close winding of the torque transmission spring around the first rotating member is performed or released in response to the axial movement of the clutch member.

5 12. The screwdriver as defined in claim 11, wherein the clutch member includes engagement means that extends toward the first rotating member, the clutch means being urged away from the first rotating member by a spring, the clutch member being adapted and arranged to move toward the first rotating member so as to oppose to the biasing force of the spring when the screw-tightening torque exceeds a predetermined torque, such that the engagement member  
10 engages the torque transmission spring so as to release the close winding of the torque transmission spring around the first rotating member.

13. The screwdriver as defined in claim 9, further comprising a first torque transmission path and a second torque transmission path, wherein the rotating torque of the motor is transmitted  
15 from the first rotating member to the tool via the torque transmission spring and the second rotating member through the first torque transmission path, and when the motor is rotated in a reverse direction so that the torque transmission by the torque transmission spring is released, the torque of the motor rotating in the reverse direction is transmitted from the first rotating member to the tool via a one-way clutch through the second torque transmission path.

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14. A screwdriver, comprising:  
a motor,  
a first spindle that rotates together with the motor and receives a rotating torque of the  
motor,  
25 a second spindle that is adapted to rotate around the same longitudinal axis as the first

spindle by receiving the rotating torque of the first spindle,

a driver bit that performs a screw tightening operation by receiving the rotating torque via the first spindle and the second spindle,

a torque transmission spring that is closely wound around the first spindle and the  
5 second spindle when the motor drivingly rotates the first spindle in a predetermined rotating direction, so that the torque transmission spring transmits the rotating torque of the motor from the first spindle to the second spindle, and

a torque transmission releasing device that moves in the axial direction of the first spindle or the second spindle in response to the screw-tightening torque, wherein the torque  
10 transmission device engages with the torque transmission spring so as to prevent the torque transmission spring from being closely wound in the rotational direction of the first spindle, so that the torque transmission releasing device releases the close winding of the torque transmission spring around at least one of the first spindle and the second spindle to release the transmission of the rotating torque of the motor from the first spindle to the second spindle.

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15. A screwdriver, comprising:

a motor,

a first spindle that rotates together with the motor and receives a rotating torque of the  
motor,

20 a second spindle that is adapted to rotate by receiving the rotating torque of the first spindle,

a driver bit that performs a screw tightening operation by receiving the rotating torque via the first spindle and the second spindle,

a torque transmission spring that is closely wound around the first spindle and the  
25 second spindle when the motor drivingly rotates the first spindle in a predetermined rotating

direction, so that the torque transmission spring transmits the rotating torque of the motor from the first spindle to the second spindle,

a third spindle that is disposed adjacent to the second spindle and in the vicinity of the tool, and

5 a clutch member that connects the second spindle to the third spindle, the clutch member being adapted to move toward the first spindle in the axial direction in response to the screw-tightening torque, wherein the close winding of the torque transmission spring around the first spindle is performed or released in response to the axial movement of the clutch member.

10 16. A screwdriver, comprising:

a motor,

a first spindle that rotates together with the motor and receives a rotating torque of the motor,

15 a second spindle that is adapted to rotate by receiving the rotating torque of the first spindle,

a driver bit that performs a screw tightening operation by receiving the rotating torque via the first spindle and the second spindle,

20 a torque transmission spring that is closely wound around the first spindle and the second spindle when the motor drivingly rotates the first spindle in a predetermined rotating direction, so that the torque transmission spring transmits the rotating torque of the motor from the first spindle to the second spindle,

a third spindle that is disposed adjacent to the second spindle and in the vicinity of the tool, and

25 a clutch member that connects the second spindle to the third spindle, wherein the clutch member includes an engagement member that extends toward the first spindle, the clutch member

being urged away from the first spindle by a spring, the clutch member being adapted and arranged to move toward the first spindle so as to oppose to the biasing force of the spring when the screw-tightening torque exceeds a predetermined torque, such that the engagement member engages the torque transmission spring so as to release the close winding of the torque transmission spring around the first spindle.

17. A screwdriver, comprising:

a motor,

a first spindle that rotates together with the motor and receives a rotating torque of the

motor,

a second spindle that is adapted to rotate by receiving the rotating torque of the first spindle,

a driver bit that performs a screw tightening operation by receiving the rotating torque via the first spindle and the second spindle,

a torque transmission spring that is closely wound around the first spindle and the second spindle when the motor drivingly rotates the first spindle in a predetermined rotating direction, so that the torque transmission spring transmits the rotating torque of the motor from the first spindle to the second spindle,

a torque transmission releasing device that moves in the axial direction of the first spindle or the second spindle in response to the screw-tightening torque, wherein the torque transmission device engages with the torque transmission spring so as to prevent the torque transmission spring from being closely wound in the rotational direction of the first spindle, so that the torque transmission releasing device releases the close winding of the torque transmission spring around at least one of the first spindle and the second spindle to release the transmission of the rotating torque of the motor from the first spindle to the second spindle, and



a first torque transmission path and a second torque transmission path, wherein the rotating torque of the motor is transmitted from the first spindle to the tool via the torque transmission spring and the second spindle through the first torque transmission path, and when the motor is rotated in a reverse direction so that the torque transmission by the torque  
5 transmission spring is released, the torque of the motor rotating in the reverse direction is transmitted from the first spindle to the tool via a one-way clutch through the second torque transmission path.